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Original article

Adolescents' Media Exposure May Increase Their Cyberbullying Behavior: A Longitudinal Study

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A B S T R A C T

Purpose: The aim of this study was to examine the effect of adolescents' exposure to media portraying antisocial and risk behavior on cyberbullying behavior over time. Previous research established relatively high prevalence of cyberbullying behavior among adolescents, although not much is known about the possible predictors of cyberbullying behavior. This study examines the long-term effects of media exposure herein. Furthermore, we examined whether boys and girls differ in this respect.

Methods: The long-term effects were tested in a longitudinal design with three waves (N = 1,005; age range, 11–17 years; 49% boys). Measured variables: cyberbullying behavior and exposure to media with antisocial and risk behavior content.

Results: Results of mixed-model analyses showed that higher levels of exposure to media with antisocial and risk behavior content significantly contributed to higher initial rates of cyberbullying behavior. Moreover, an increase in exposure to antisocial media content was significantly related to an increase in cyberbullying behavior over time. For both boys and girls, higher exposure to antisocial and risk behavior media content increases cyberbullying behavior over time though more clearly for boys than for girls.

Conclusions: This study provided empirical support for the amplifying effect of exposure to antisocial media content on adolescents' cyberbullying behavior over time. Results are discussed in view of adolescents' media use and the larger theoretical framework.

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IMPLICATIONS AND
CONTRIBUTION

This study contributes to the better understanding of the long-term effects of media exposure on cyberbullying behavior. An increase in exposure to media with antisocial and risk behavior content relates to an increase in cyberbullying behavior over time. Continued research is needed to examine which adolescents are especially prone.

Cyberbullying behavior received much research attention over the past few years, likely because of the prevalence of cyberbullying incidents reported in the media with severe consequences (e.g., see special journal issues about cyberbullying) [1,2]. Research shows that cyberbullying negatively affects adolescents' self-esteem, academic performances, and suicidal ideation among others [3–7]. Although not much is known about

possible predictors of cyberbullying behavior, previous research showed that one such factor is media exposure. Former studies found significant relationships between exposure to media with violent content and *face-to-face* bullying as well as cyberbullying [8–13]. Recent research included a broader scope of antisocial media exposure, including not only violence portrayals but also other types of antisocial and risk behavior content such as stealing, substance abuse, and sexual intimidation, to be related to cyberbullying behavior [14]. However, to our knowledge, no research exists thus far that examined the longer term relationships between exposure to antisocial media content and cyberbullying behavior among adolescents, in particular not by means of a longitudinal investigation. The present study

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therefore applied a longitudinal design in investigating the assumed amplifying effect of exposure to media with antisocial and risk behavior content on cyberbullying behavior over time.

In the following, we elaborate the argumentation underlying our hypotheses stating that both higher initial levels of adolescents' exposure to media content portraying antisocial and risk behavior and increases over time coalesce with higher levels of cyberbullying behavior. Furthermore, we assumed this effect to be stronger for boys than for girls. Subsequently, we proceed in detailing our methodological approach and reporting the results. Finally, we discuss some limitations as well as the theoretical implications of our study in view of future research.

The role of media in cyberbullying behavior

Given the abundant media use of today's adolescents, it is an important question how repeated exposure to specific content may influence cyberbullying behavior as this peaks during adolescence. Thus far, the role of media exposure in adolescents' cyberbullying behavior has only been studied to a limited extent. Three previous studies showed significant relationships between high exposure to violent media content and an increase in face-to-face bullying behavior [9,11,13]. Furthermore, four other studies found a positive relationship between violent media use and cyberbullying behavior [8–10,12]. In a recent cross-sectional study, exposure to a broader category of antisocial and risk behavior media content (i.e., broader than violent media content alone) was positively related to cyberbullying behavior [14]. However, the longer term influence of repeated exposure to media with antisocial and risk behavior content on adolescents' cyberbullying behavior is not yet known.

In the present study, we propose an amplifying effect of antisocial media exposure on cyberbullying behavior over time, which is supported by developmental theories as well as by social cognitive theory [15] and the downward spiral model [16]. Social cognitive theory suggests that individuals vicariously learn from what they encounter in the media, especially because such behaviors are often rewarded in violent video games, movies, clips, and television shows [15,17,18]. Furthermore, our assumption of an amplifying association between exposure to antisocial and risk behavior media content and cyberbullying behavior is in line with the downward spiral model [16]. The downward spiral model proposes that violent media use and aggressive behavior mutually reinforce each other. These lines of thought were recently brought together and supported by a study showing that adolescents' exposure to media with antisocial and risk behavior content significantly contributed to explain the association between being bullied in class (face-to-face victimization) and becoming a cyberbully oneself [14].

Because of their developmental stage, adolescents are looking for attractive role models to identify with, which they find abundantly in the media [17]. This might make them specifically susceptible to model their behavior after the media models they look up to. Accordingly, antisocial media content in which antisocial and risk behavior such as swearing, fighting, and substance abuse are portrayed, and often glorified, seems highly popular among adolescents [19,20]. This may coincide with the need they feel to portray deviant behaviors in search for an independent identity [21–23]. In extending this developmental line of reasoning together with the social cognitive theory and downward spiral model, we argue that adolescents' media exposure will play a role in their (cyber)bullying behavior. That is,

adolescents who are repeatedly exposed to antisocial media content will more likely be influenced by such antisocial and deviant behaviors as portrayed in media offerings and more likely to get involved in cyberbullying behaviors. Following the above, two hypotheses were formulated:

H1: adolescents' exposure to antisocial media content is positively related to initial rates in cyberbullying behavior.

H2: an increase over time in adolescents' exposure to antisocial media content is positively related to an increase over time in cyberbullying behavior.

Gender differences in cyberbullying behavior and the role of media

In "traditional" bullying, boys are more often the bullies and the aggression is often expressed directly (e.g., [24]). Researchers hypothesized that in cyberbullying, girls would be more often the perpetrator because cyberbullying involves more relational bullying than direct aggression (e.g., [25]). However, research regarding gender differences in cyberbullying behavior showed mixed results thus far (see meta-analysis [26]). Some studies found that boys were more likely to be cyberbullies than girls (e.g., [8,10]), whereas others found girls to be more often a cyberbully than boys (e.g., [25]), and yet others found no gender differences in cyberbullying behavior (e.g., [27]). Given these mixed results, it is important to include gender in our analyses.

Developmental and media violence research showed that boys in general are more heavy consumers of violent and antisocial media content than girls [17,28,29]. Following the rationale of the social cognitive theory and downward spiral model, one would assume that this male preference for antisocial media content makes it more likely to find a stronger relationship between media use and cyberbullying behavior for boys than for girls. Therefore, we proposed the following hypothesis:

H3: the influence of antisocial media exposure on cyberbullying behavior over time is stronger for boys than for girls.

Methods

Participants and procedure

A total of 1,005 adolescents participated in the study, aged 11–17 years (age: $M_{\text{wave1}} = 13.43$, standard deviation [SD] = 1.06; $M_{\text{wave2}} = 13.62$, SD = 1.07; $M_{\text{wave3}} = 13.89$, SD = 1.09). The three waves in the longitudinal design were spread over the beginning (T_1), middle (T_2), and end (T_3) of a regular year in secondary school, located in two schools. Five hundred sixty-eight respondents participated in all three waves, 326 respondents participated in two waves, and 111 respondents participated only in one wave. Variations occurred because of pupils' absences. Thus, the response rates in the three waves were 78.8%, 74.0%, and 75.6%, respectively. A total of 37.5% participants were in the first grade (aged around 12 years), 30.0% in the second grade (aged around 13 years), and 32.5% in the third grade (aged around 14 years). The majority was white Caucasian (60.2%); others had a Turkish (20.2%), Surinam (4.9%), Moroccan (1.9%), or other background (12.8%). The Institutions' Committee on Human Subjects has approved the protocol of this study. Data were collected in class using a paper–pencil questionnaire. Responses were anonymous, and a debriefing followed on completion of questionnaires in class. Parental passive consent rate was 100%, and none of the students refused to participate in the study, thanks to the participating

schools and classwise procedure. Each wave had about 20% missing data because students were absent because of external internships, and sickness ($n_{\text{wave1}} = 792$; 49% boys; $n_{\text{wave2}} = 740$; 49% boys; $n_{\text{wave3}} = 762$; 48% boys). Missing data were handled according to recent insights of hot-deck imputation [30]. Decks used to impute missing data were gender, age, and grade.

Measures

All measures were taken with Likert-type items, each followed by five-point rating scales (1 = never, 2 = incidentally, 3 = several times, 4 = often, and 5 = very often).

Cyberbullying behavior. Cyberbullying behavior was measured using the cyberbullying questionnaire (CBQ) [8]. Because a number of items showed overlap given today's smartphone technology, we combined several items of the original 16 items, resulting in a total of eight items. For example, "Sending threatening or insulting messages by e-mail" was combined with "Sending threatening or insulting messages by cell phone." For the revised CBQ, see Appendix A. Sumscores were calculated (minimum score, 8; maximum score, 40) and the resulting eight-item CBQ was reliable with an average Cronbach α of .82 (average of three waves: $M = 8.87$, $SD = 2.49$). Some researchers argued that, in contrast to face-to-face bullying, repetitiveness is not a prerequisite for cyberbullying because a single act such as spreading rumors about someone online can lead to ongoing humiliation and may last on the Internet forever [2,31]. Furthermore, adolescents may find it hard to admit that they performed cyberbullying behavior. This implies that an answer of "happened incidentally" could possibly mean that it happened more often. Therefore, a score higher than 8 on the CBQ indicates that a respondent has been committing cyberbullying behavior.

Exposure to antisocial media content. Antisocial media exposure was measured by the eight-item antisocial media content factor of the Content-based Media Exposure (C-ME) scale [14]. The C-ME scale measures how often someone is exposed to portrayals of various types of antisocial and risk behavior as portrayed in media content, such as fighting, drug use, and general antisocial behaviors (e.g., stealing, destroying someone's property). The items were based on the extant literature regarding adolescent antisocial and risk behaviors (e.g., [32]). Sample items are "How often do you watch people who fight (on the Internet/TV/DVD/in games/mobile phone)?" and "How often do you watch people who destroy someone else's belongings (on the Internet/TV/DVD/in games/mobile phone)?" All items can be found in Appendix B. The C-ME scale was reliable with an average Cronbach α of .89 (average of three waves: $M = 2.27$, $SD = .90$). Mean-centered scores were computed to use in further analyses.

Results

Preliminary analyses

To examine the longitudinal model, a mixed-model analysis [33] was conducted in SPSS (version 19; IBM Corp, Armonk, NY). In the mixed-model analysis, several covariance structures of cyberbullying were tested. Based on these comparisons, using the Akaike Information Criterion indices, a diagonal structure of the covariance matrix of random effects was selected [33]. A

mixed model with cyberbullying behavior, time, and quadratic time was conducted (with diagonal covariance matrix) to analyze whether the effect of antisocial media exposure on cyberbullying behavior was linear or quadratic.

The Level 1 covariance structure implies that the residuals associated with individuals and time points are independent and normally distributed (Wald $z = 15.77$; $p < .001$). The estimates of fixed effects suggested that we should use the linear time variable instead of the quadratic time variable (linear: $t = 2.26$, $p < .05$; quadratic: $t = -1.15$, $p = .12$) [33]. A mixed model was conducted with cyberbullying behavior, time (three waves), exposure to media with antisocial and risk behavior content (mean centered), gender, an interaction between time and media, an interaction between time and gender, and a three-way interaction between time, media, and gender. Table 1 shows that respondents' initial cyberbullying intercept (β_{00}) was 8.59. Time was significantly related to cyberbullying ($\beta_{01} = .19$; $t = 2.53$; $p < .05$). This indicates that on average cyberbullying rates increased over each measurement interval within individuals.

Table 1 further shows that gender was not significantly related to differences in initial cyberbullying rates ($\beta_{03} = -.01$; $t = -.05$; $p = .96$), and the interaction effect of time and gender was not significant ($\beta_{05} = -.10$; $t = -.94$; $p = .35$). This means that boys do not make a different growth over time in cyberbullying rates than girls do (note that media exposure is not yet included). In Table 2, the descriptive statistics for cyberbullying rates are given, separated by gender. Independent t tests showed that on all three time points, boys performed more cyberbullying behavior than girls (T_1 : $t(793) = 2.66$, $p < .05$; T_2 : $t(743) = 2.98$, $p < .01$; T_3 : $t(770) = 3.67$, $p < .01$).

Testing hypotheses: exposure to antisocial media content and cyberbullying behavior

To test the effect of exposure to media with antisocial and risk behavior content, the same model presented in Table 1 was used. Results showed that media exposure was significantly related to differences in initial cyberbullying ($\beta_{02} = .38$; $t = 3.15$; $p < .001$). These results support H1: higher levels of exposure to media

Table 1
Estimates of fixed effects of cyberbullying

Parameter	Estimate	SE	β	df	t	p
Intercept	8.59	.13	—	642.08	63.81	.00
Time	.19	.08	—	663.07	2.53	.01
Media	.38	.12	—	780.38	3.15	.00
Gender	-.01	.20	—	644.80	-.05	.96
Time \times media	.33	.07	—	1,061.54	4.73	.00
Time \times gender	-.10	.11	—	651.97	-.94	.35
Time \times media \times gender	-.28	.07	—	1,455.84	-3.90	.00
Dependent: Δ cyberbullying $T_2 - T_1$						
Boys: media_ $T_2 - T_1$	.65	.28	.14	—	2.35	.02
Girls: media_ $T_2 - T_1$	.71	.20	.21	—	3.66	.00
Dependent: Δ cyberbullying $T_3 - T_2$						
Boys: media_ $T_3 - T_2$	.64	.27	.14	—	2.41	.02
Girls: media_ $T_3 - T_2$	.19	.16	.07	—	1.17	.24

The upper half of the table represents the mixed model. Time, media, and gender in the first lines refer to main effects. Two-way interactions are indicated with one \times , three-way interactions with two \times . The bottom half of the table represents the two linear regressions of media exposure on cyberbullying behavior, separated by gender.

In the mixed model, no standardized estimates are provided. In the regressions, no degrees of freedom are provided.

β = standardized estimate; df = degrees of freedom; SE = standard error.

Table 2

Cyberbullying rates, separated by gender

Parameter	Mean	SD	df	t	p
Time point 1					
Boys (n = 389)	8.88	2.42			
Girls (n = 406)	8.51	1.34			
Independent t test T ₁			793	2.66	.01
Time point 2					
Boys (n = 360)	9.19	3.12			
Girls (n = 385)	8.64	1.70			
Independent t test T ₂			743	2.98	.00
Time point 3					
Boys (n = 368)	9.42	3.85			
Girls (n = 404)	8.62	1.73			
Independent t test T ₃			770	3.67	.00

df = degrees of freedom; SD = standard deviation.

with antisocial and risk behavior content significantly contributed to higher initial rates of cyberbullying behavior. Furthermore, the interaction of time and media exposure was significant ($\beta_{04} = .33$; $t = 4.73$; $p < .001$), indicating that participants who are more exposed to antisocial media have a higher growth rate (i.e., a steeper slope) in cyberbullying rates.

Only for visualization purposes, a dummy variable was created for media exposure (0 = lower than average or average antisocial media exposure; 1 = higher than average antisocial media exposure). Figure 1 shows that adolescents with higher than average exposure to media with antisocial content had higher initial cyberbullying rates than adolescents lower than average exposure to this media content (supported by the significant effect of media exposure on cyberbullying rates in Table 1). Furthermore, the slopes of cyberbullying rates over time of adolescents with higher exposure to antisocial media increased faster than the slopes of adolescents lower on media exposure (supported by the significant interaction effect of time and media exposure on cyberbullying rates). This supports H2: the level of cyberbullying behavior increased faster over time with higher levels of exposure to antisocial media content.

Gender differences in the effect of exposure to antisocial media content on cyberbullying behavior

The H3 suggested that antisocial media exposure on cyberbullying behavior over time influences boys more strongly than girls. The three-way interaction of time, media, and gender on cyberbullying rates was significant ($\beta_{06} = -.28$; $t = -3.90$; $p < .001$). Apparently, the slopes of time and media exposure on

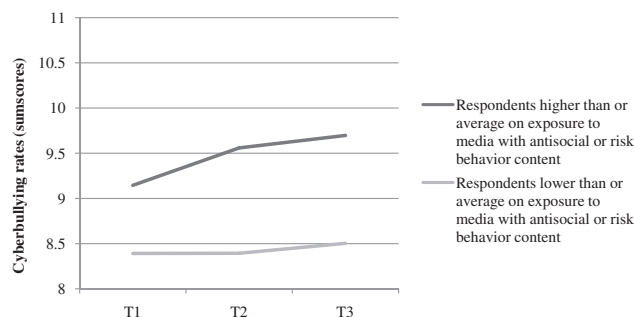


Figure 1. Cyberbullying rates over time. The horizontal axis reflects the various time points during one regular school year. The vertical axis reflects sumscored cyberbullying rates.

cyberbullying rates were different for boys and girls. Figures 2 and 3 visualize this difference. First, at T₁, the gap in cyberbullying rates between those lower and those higher in media exposure is larger for boys than for girls. For both boys and girls, the slope for those higher in media exposure to antisocial and risk behavior content increases over time.

To fully understand the difference between boys and girls in the effect of antisocial media exposure on cyberbullying rates, post hoc analyses were conducted. Two regressions were performed to examine the separate slopes between the time intervals. Hence, four difference-score variables were created: cyberbully rate T₂ minus T₁ (cb_T₂ – T₁ in Table 1); cyberbully rate T₃ minus T₂ (cb_T₃ – T₂); media exposure T₂ minus T₁ (media_T₂ – T₁); and media exposure T₃ minus T₂ (media_T₃ – T₂). A first regression analysis included cb_T₂ – T₁ as the dependent variable and media_T₂ – T₁ as the independent variable. The output was ordered by gender (Table 1). Results showed for both boys and girls that an increase in their media exposure resulted in an increase in their cyberbullying rates ($\beta_{boys} = .14$, $t = 2.35$, $p < .05$; $\beta_{girls} = .21$, $t = 3.64$, $p < .01$). A second regression analysis investigated the change between T₂ and T₃ (dependent cb_T₃ – T₂, independent media_T₃ – T₂; Table 1). This time, the influence of increased media use on cyberbullying rates was significant for boys only ($\beta_{boys} = .14$; $t = 2.41$; $p < .05$), whereas not for girls ($\beta_{girls} = .07$; $t = 1.17$; $p = .24$). Thus, although we see a continued increase in cyberbullying rates for girls high in media exposure over time (Figure 3), as for the boys, in the statistical test, this increase among girls is weighed out by the decrease in cyberbullying rates for the girls low in media exposure. (Note that the dummy variable was created for visualization purposes only.)

Given these results, H3 was partly supported; exposure to antisocial media and risk behavior content on cyberbullying behavior over time did influence boys more strongly than girls, but only in the longer run (i.e., not between T₁ and T₂, but from T₂ to T₃). For boys, an increase in exposure to media with antisocial content further increases cyberbullying behavior over time. However, for girls, after a significant increase between T₁ and T₂, a further increase in media exposure at T₃ is less clear and explicitly holds for girls high in exposure to media with antisocial content.

Discussion

The present study aimed to examine how adolescents' exposure to antisocial and risk behavior content in popular media fare influences both the initial cyberbullying behavior and

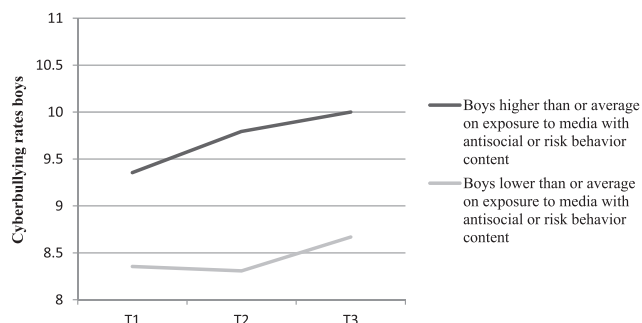


Figure 2. Cyberbullying rates over time for boys. The horizontal axis reflects the various time points during one regular school year. The vertical axis reflects sumscored cyberbullying rates.

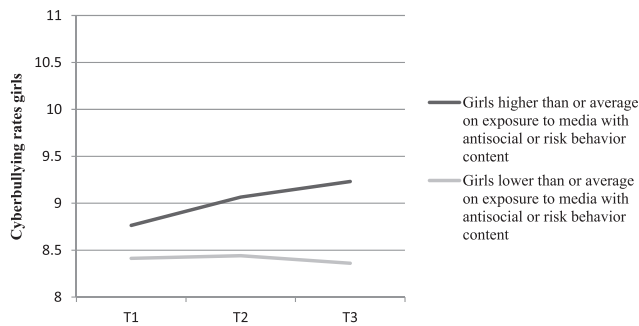


Figure 3. Cyberbullying rates over time for girls. The horizontal axis reflects the various time points during one regular school year. The vertical axis reflects sumscored cyberbullying rates.

in the longer term. The results of our three-wave longitudinal study showed that higher levels of exposure to media portraying antisocial and risk behavior significantly contributed to higher initial rates of cyberbullying behaviors in adolescents. Furthermore, the cyberbullying behavior increased faster over time with higher levels of exposure to antisocial media content. In addition, for both boys and girls, higher exposure to antisocial media content increases cyberbullying behavior over time, though more clearly for boys than for girls.

Our results are consistent with social cognitive theory [15], in terms of modeling or vicarious learning through role models and examples aired through media fare and the reinforcing impact of violent media on aggressive behavior. Next, results support the downward spiral model [16], which proposes reinforcement between violent media exposure and aggressive behavior. Clearly, cyberbullying behavior can be seen as a form of aggressive behavior. Furthermore, the results are in line with previous findings in media effects on (cyber)bullying [8–14]. Our study not only confirms these lines of thought but also extends the role of media in demonstrating that a wider array of media content, including media portraying aggressive and antisocial behaviors as well as risk and deviant behaviors such as stealing and substance use, is significantly related to cyberbullying behavior among adolescents. Our findings further extend previous research in demonstrating that exposure to antisocial media content is not only related to cyberbullying at one particular point in time but also mutually related in increasing levels of cyberbullying behavior over time. Although boys and girls did not differ in this respect, the continued influence of media exposure on cyberbullying over time is stronger for boys than for girls. Perhaps, boys and girls differ in how they cope with unpleasant feelings related to cyberbullying which differentiates their behavioral response in the longer run. The generally higher levels of empathy in girls may, for example, prevent them from further increases compared with boys [34]. Future research is warranted here.

The strength of a longitudinal research design cannot prevent that this study also faced some limitations. First, cyberbullying behavior was measured using a self-report scale. Obviously, cyberbullying is a sensitive topic that is open to social desirability in answering questions. Possibly, the cyberbullying rates in this study are an underestimation of the true rates as is the subject of discussion in many studies in cyberbullying (e.g., [25,35–38]). The prevalence rates of cyberbullying found in the present study (33.5% of boys and 24.4% of girls had committed cyberbullying

behavior) were quite high, although no consensus exists on prevalence rates of cyberbullying perpetration. Most rates are below 20% (see meta-analysis [26]). Indeed, the prevalence rates appear to be quite different in international comparisons. This is in large part related to how the researchers define cyberbullying behavior, to sample differences in ages and countries, to the reported time frame (e.g., “last 6 months” or “lifetime”), and to the criteria applied to classify a participant as a cyberbully (see recent meta-analyses [26,39]). Important to note, however, is that despite a possible underestimation, significant effects were found; possibly, the relationship between exposure to antisocial media content and cyberbullying behavior is actually stronger than that found in this study. Furthermore, boys reported higher levels of cyberbullying perpetration than girls. However, the cyberbully levels of boys and girls may in fact not differ that much, but girls might be more inclined to socially desirable answers because of prosocial moral reasoning [27]. Future studies may include prosocial moral reasoning.

A second limitation of longitudinal designs is that a bias may occur as linked with attrition rate. However, the pupils did not know beforehand when we would attend their school for the second and third waves and thus cannot have deliberately dropped out to avoid participating in our study and dropping out of school during the year is quite uncommon. The classwise procedure during school hours limited a naturally occurring attrition rate. However, each wave (including the first) had about 20% absence because of external internships and sickness. This is not attrition, but rather a kind of random presence. Furthermore, although the adolescent participants were located in two schools, there is no reason to assume that the adolescents in the present study would substantially differ from others. Nevertheless, external validation should be further improved by replication studies.

A third limitation to the present study is that a longitudinal design can serve as a good indicator of causality, but causal inferences must still be viewed cautiously. Furthermore, previous research found a relationship between being a victim of (cyber) bullying behavior and becoming a cyberbully oneself (e.g., [14,40]). In the present study, however, victimization was not taken into account. It is important to further study the role of victimization in the relation between exposure to media with antisocial and risk behavior content and cyberbullying behavior in future research. Likewise, other possible risk factors of cyberbullying behavior have been found in meta-analyses [26,39] such as anger and frustration, mental health issues, and moral disengagement. Future research may examine the various weights of risk factors.

Summarizing, this study provided empirical support for the amplifying effect of adolescents' exposure to media portraying antisocial and risk behavior on cyberbullying behavior over time, for boys more strongly so than for girls. Expanding our knowledge about the underlying processes of cyberbullying and the role of media exposure therein among adolescents is highly relevant, given the current prevalence of cyberbullying behavior and its severe consequences for the victims—even more so with the increasing prevalence and importance youngsters place on social media and the Internet. Our research indicates that media exposure plays a significant role in cyberbullying behavior and must be considered when developing prevention and intervention programs. For example, media literacy lessons in which adolescents learn how media exposure may affect their attitudes and behavior. In all, our results indicate that adolescents'

exposure to antisocial media content cannot just be considered a lighthearted leisure activity but seriously amplifies cyberbullying behavior.

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Supplementary Data

Supplementary data related to this article can be found at <http://dx.doi.org/10.1016/j.jadohealth.2014.09.016>.

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